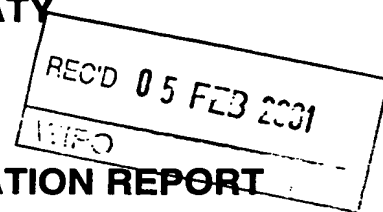


PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)





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| Applicant's or agent's file reference<br>44407   | <b>FOR FURTHER ACTION</b><br>See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |  |
| International application No.<br>PCT/US99/25974  | International filing date (day/month/year)<br>04/11/1999   | Priority date (day/month/year)<br>05/11/1998 |
| International Patent Classification (IPC) or national classification and IPC<br>C08J3/20 |  |  |
| Applicant<br>THE DOW CHEMICAL COMPANY et al.   |  |  |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
  - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

|   |  |
|---|--|
| Date of submission of the demand<br>24/05/2000  | Date of completion of this report<br>01.02.01  |
| Name and mailing address of the international preliminary examining authority:<br> European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465 | Authorized officer<br>Hutton, D<br>Telephone No. +49 89 2399 8660<br> |

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/25974

## I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

### Description, pages:

1,1a,2,3                      with telefax of                      02/11/2000

### Claims, No.:

19                              as originally filed

1-18                              with telefax of                      02/11/2000

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description,                      pages:
- ☐ the claims,                              Nos.:
- ☐ the drawings,                              sheets:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/US99/25974

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

|                               |      |        |      |     |
|-------------------------------|------|--------|------|-----|
| Novelty (N)                   | Yes: | Claims | 1-18 | Yes |
|                               | No:  | Claims |      |     |
| Inventive step (IS)           | Yes: | Claims | 1-18 | Yes |
|                               | No:  | Claims |      |     |
| Industrial applicability (IA) | Yes: | Claims | 1-18 | Yes |
|                               | No:  | Claims |      |     |

2. Citations and explanations  
**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/US99/25974

**Section V:-** Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

D1: US-A-4 558 075 (SUSS NAOMI R ET AL) 10 December 1985 (1985-12-10)

D2: WO 93 04117 A (ALLIED SIGNAL INC) 4 March 1993 (1993-03-04)

D3: EP-A-0 459 472 (TOYODA CHUO KENKYUSHO KK) 4 December 1991 (1991-12-04)

D4: (XP000551307) POLYMER LAYERED SILICATE NANOCOMPOSITES  
ADVANCED MATERIALS, DE, VCH VERLAGSGESELLSCHAFT, WEINHEIM,  
GIANNELIS E P (ISSN 0935-9648)

D5: US-A-4 964 918 (BROWN, RICHARD K et al) 23 October 1990 (1990-10-23)

**Novelty:-** None of the documents (D1-D3) cited in the International Search Report disclose the preparation of nanocomposites from an anionic polymer edge coated quaternary intercalated multi-layered silicate material.

**Inventive Step:-** Closest Prior Art:- Processes and products of processes to produce nanocomposites involving the use of quaternary ammonium exchanged layer minerals

Difference:- Multi-layered silicate is "edge coated" with a polyvalent anionic polymer.

Technical Effect:- Improved (cf:- p.2, ll.16-18) exfoliation of the layer silicate in the composite and dispersion of the silicate in the polymer.

Objective Problem: - To promote the above.

Obvious: No, although as indicated in document D5 (cf. col.3, l.31 - col.4, l.57) the use of anionic polymers to prevent the agglomeration of the exfoliated layers is known in the treatment of clays for borehole applications. However the use of edge coating to improve the dispersibility of the silicate in a polymer matrix is not taught. Inventive Step is therefore conceded.

## PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

|  |  |
|--|--|
| <b>Date of mailing (day/month/year)</b><br>19 June 2000 (19.06.00)               | <b>Applicant's or agent's file reference</b><br>44407                |
| <b>International application No.</b><br>PCT/US99/25974                           | <b>Priority date (day/month/year)</b><br>05 November 1998 (05.11.98) |
| <b>International filing date (day/month/year)</b><br>04 November 1999 (04.11.99) |  |
| <b>Applicant</b><br>CHOU, Chai-Jing et al  |  |

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
24 May 2000 (24.05.00)

☐ in a notice effecting later election filed with the International Bureau on:  
\_\_\_\_\_

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

|  |  |
|--|--|
| <p>The International Bureau of WIPO<br/>34, chemin des Colombettes<br/>1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p> | <p>Authorized officer</p> <p>Kiwa Mpay</p> <p>Telephone No.: (41-22) 338.83.38</p> |
|--|--|

From the INTERNATIONAL BUREAU

**PCT**

**NOTIFICATION OF ELECTION**

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ETATS-UNIS D'AMERIQUE

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Applicant

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The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

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Authorized officer

Kiwa Mpay

Telephone No.: (41-22) 338.83.38